

pushed up into the equatorial tube, and space is thus economised and strength gained; and the alteration of ratio of focal length to aperture is one which only brings convenience with it. The correction thus obtained gives very satisfactory results in spectroscopic work.

In having the lens made I intended also to see whether the resulting image could be enlarged by an enlarging camera attached to the equatorial, and had hoped that satisfactory enlargements of planets might thus be obtained, inasmuch as in such work the field is small.

I have made several attempts to photograph *Jupiter*, and have hitherto got results that do not satisfy me. The failure I attribute in part to the difficulty of the subject—the detail is very fine—in part to unfavourable atmospheric conditions, and in part to the imperfection of the correcting lens. I have pleasure in exhibiting to the Society a slide showing the sort of result obtained. In order to test the performance of the enlargement apparatus on other objects, and for the sake of being able more easily to focus the camera, I have taken some enlargements of lunar craters with the same arrangement. Of these also I exhibit slides. The plates on which the originals were taken are Edwards's instantaneous isochromatic; a light yellow glass was used as screen, and the enlargement of the corrected image is sixfold.

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*The Star Cluster 3315 (Cape Observations).*

By H. C. Russell, B.A., F.R.S.

The remarkable discovery by MM. Henry of a nebulous background to the *Pleiades* induced me to experiment with the same object in view on the finest of our southern star clusters, which Herschel describes as “the most brilliant object of the kind I have ever seen”; “a glorious cluster of immense magnitude, being at least two fields each way”; and in another place (two or three fields each way), “the stars are 8, 9, 10, and 11 magnitudes, but chiefly of the tenth, of which there must be at least 200.”

Three photographs have been taken with a view of finding out if there existed any nebulous light amongst the stars of this magnificent cluster. The first was taken on 1893 April 11, and was exposed in the star camera  $7\frac{1}{2}$  hours. On it there is not the slightest sign of any nebulous background, although the plate has recorded in the square degree in which the cluster stands no fewer than 12,702 stars. The second was taken on April 12, and was exposed for  $6\frac{3}{4}$  hours. The night was better than that of the 11th, and as a consequence the plate shows 14,551 stars in the same square degree, and on this also there is

no sign of nebulous background. The third was taken April 23, and it was exposed for  $6^h 35^m$ , and this also is altogether without nebulous background, although it shows 10,946 stars in the same square degree.\*

The photographic plates used were extremely sensitive, so much so that seven hours' exposure on them would be equivalent to at least ten hours on the plates in use two years since. I think, therefore, that we may assume that there is no nebulous background to the star cluster H 3315 at all approaching that in the *Pleiades* in brilliance. This cluster appears to the unaided eye as a conspicuous white spot following the nebula about  $\eta$  *Argûs*, and it covers a space about equal to one square degree. It is in R.A.  $11^h 2^m$ , Decl.  $58^\circ 9'$  S. The *réseau* lines on the photograph enclose spaces 5 minutes of arc each way.

[Slide 10 shows this cluster as photographed here with the star camera, and slide 9 its relation in position to  $\eta$  *Argûs*. If No. 9 numbered corner be held as upper right-hand corner the top is north and the left the following side, and the cluster follows the nebula about one inch, and a little north.]

1894 February 2.

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### *A Seconds Contact-Maker for Astronomical Clocks.*

By H. C. Russell, B.A., F.R.S.

The difficulty in getting good seconds contacts from astronomical clocks, owing to irregularities due to errors in the spacing of the escape wheel and the faulty methods of contact used, has induced me on several occasions to try and get some attachment to the pendulum that would do the work. Invariably I have been unsuccessful in the search for a good working device, until in July last it occurred to me that if a wheel were attached to the pendulum rod it might be made to roll over a spring and press it down to contact without *any friction except that on the axis* of the wheel. The idea looked promising, and I had one made, which after several months' trial is good enough to publish, since it is likely to be useful to others.

The design is so simple that with the diagram herewith (Plate 7) little explanation is required.

First it will be seen that the contact is made through the medium of a very light wheel attached to the pendulum, which

\* It may be mentioned that a count of the stars in the same space ( $1^\circ$ ) in the negative taken with the portrait camera (slide No. 9) of this object, and exposed for eight hours, shows 1,355, or only one-tenth of the number shown on the negative taken with the star camera on 1893 April 12.